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THE RISK OF FIRE-SALES IN THE TRI-PARTY REPO MARKET

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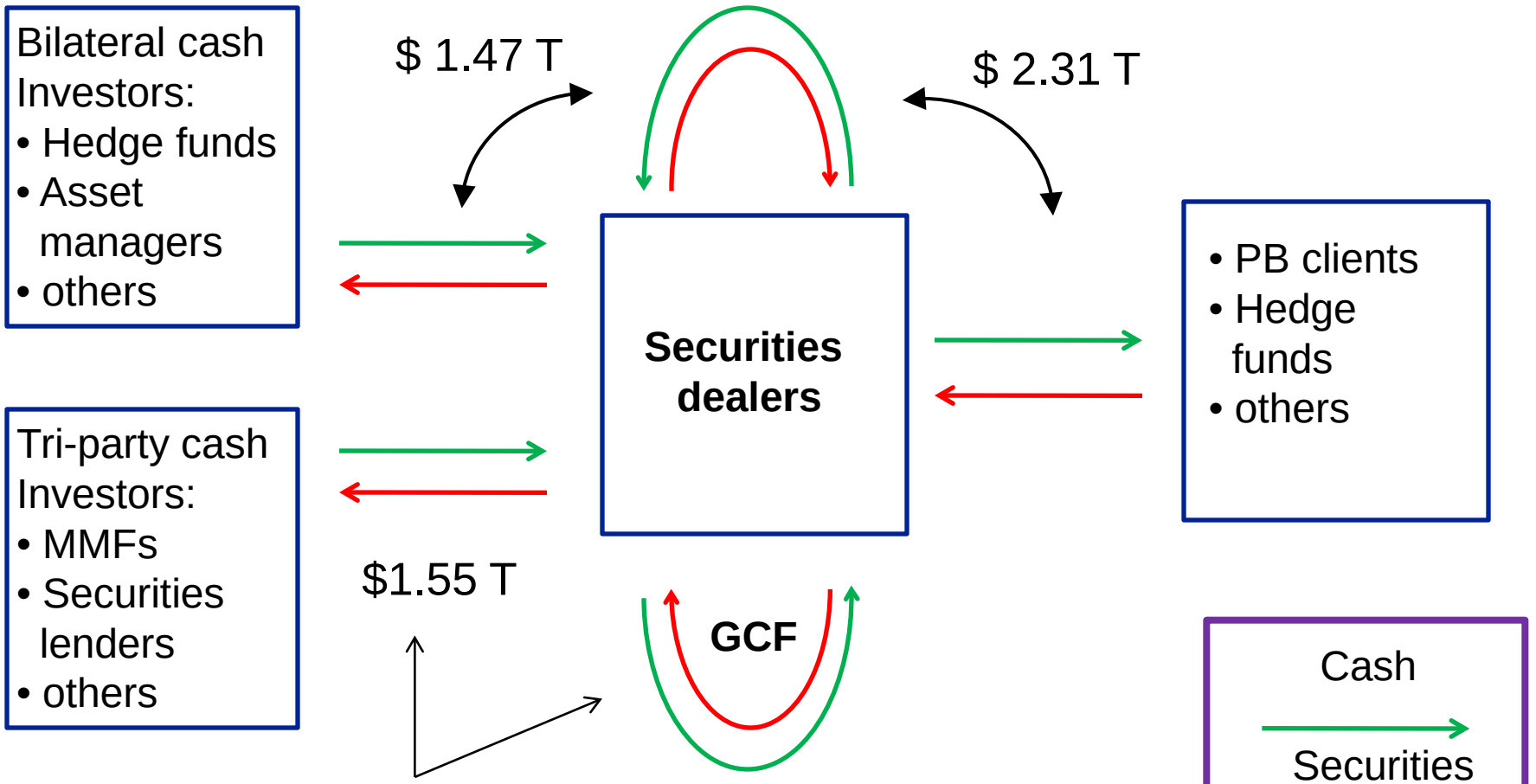
FIRE-SALE SPILLOVERS AND SYSTEMIC RISK

Outline

- Overview of the US repo market
- What are fire sales and why are they a concern?
- A framework to think about fire sales
  - Pre- vs. post-default fire sales
- Measuring fire sale risk

Segments of the U.S. repo market

Volumes as of September 2013



Tri-party repo market

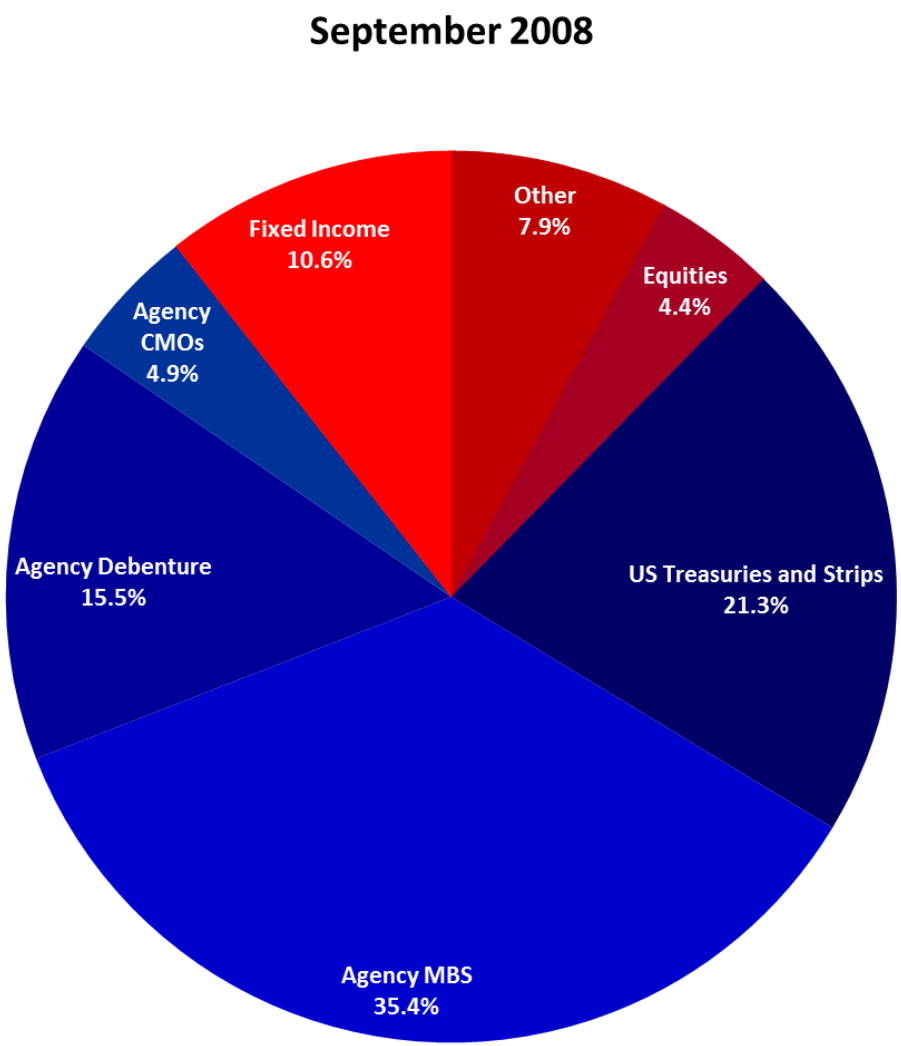
Why are fire sales a concern?

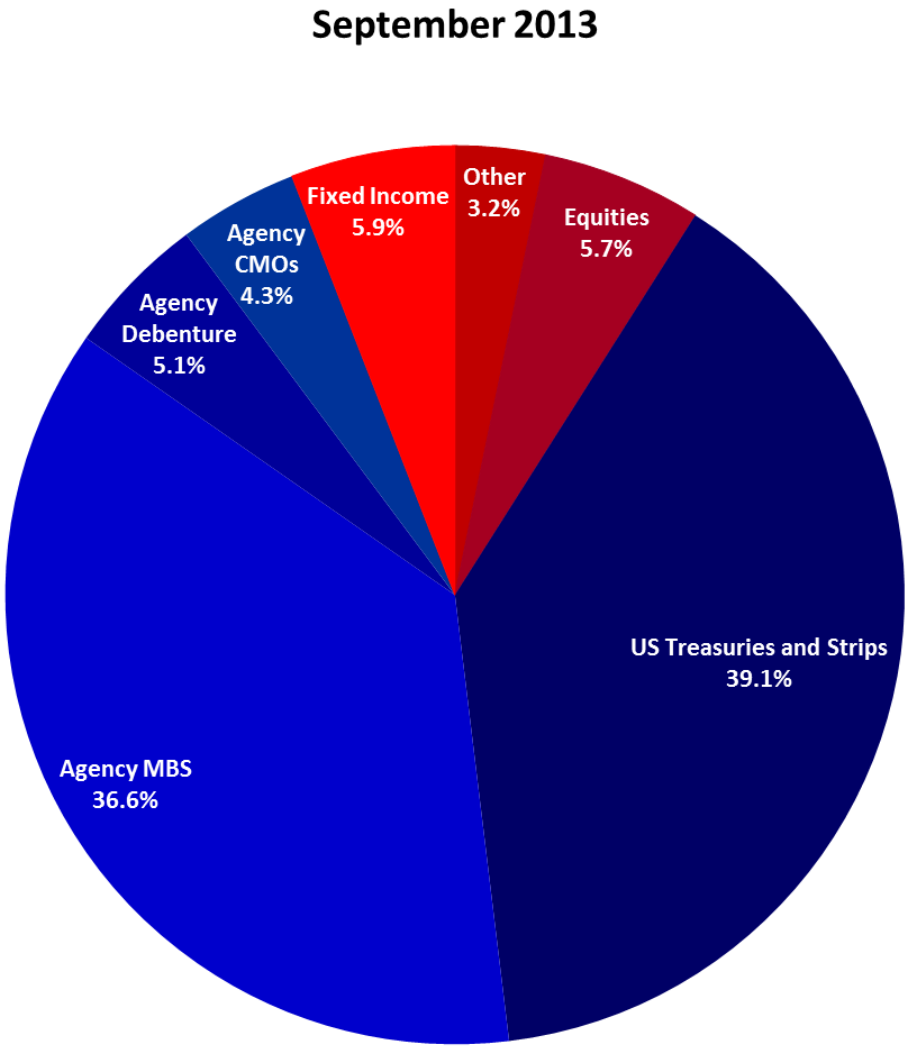
- Fire sales are an externality and can spread systemic risk
- Rapid sales exert pressure on the prices of assets
  - Other institutions holding these assets see their capital eroded and may have to delever
  - Institutions using these assets as collateral could face margin calls and may be forced to sell assets
- Price declines can affect firms unrelated to the initial problem and other markets altogether

The U.S. TPR market is a particular concern

- Large size of portfolios financed in these markets
  - Large dealers' books currently range between $100 and over $150 billion
  - Peak levels in excess of $400 billion
- Substantial amount of privately issued securities
  - About 18% of assets, almost $300 bil., as of Sep. 2013
- Some investors, such as MMFs and securities lenders, face liquidity pressures of their own
  - Could stop rolling over repos precipitously
  - May need to sell repo securities quickly after a dealer default

Collateral financed in the TPR market





Lessons from the crisis: not reassuring

- Instances of fire sales in the bilateral market:
  - Peloton
  - Thornberg
  - Carlyle
- Precipitous declines in TPR funding in a few cases
  - Bear Stearns
  - Lehman
- Worse was avoided with exceptional interventions
  - PDCF and TSLF

Pre- vs. post-default fire sales

- Pre-default fire sales relate to maturity transformation
  - Assets that cannot be financed may have to be sold
  - Similar to a bank run
  - The borrower may be “solvent but illiquid”

- Post-default fire sales occur after a borrower has defaulted when its counterparties sell their repo securities quickly
  - Repos benefit from an exemption from the automatic stay of bankruptcy

Need to address both pre- and post-default fire sales

- Addressing one risk can mitigate the other
  - …but may not eliminate it
- Reducing the risk of pre-default fire sale would make insolvency and post-default fire sale less likely
  - …but insolvency could be triggered by other factors (fraud)
- Reducing the risk of post-default fire sale would make runs and pre-default fire sales less likely
  - …but some investors may still be subject to their own liquidity pressures, which can lead to runs

Measuring fire sale risk

- Ideally, we would like to estimate the price impact of a sale of a given volume of securities in a short amount of time
  - This is complicated, probably highly non-linear, and state dependent
  - No standard econometric method
- Instead, we use indirect methods
  1. Days required to liquidate hypothetical tri-party repo portfolio
  2. Fire-sale losses after hypothetical shock to assets

Hypothetical tri-party repo portfolio

- We assume a portfolio of $150 Billion
- Asset breakdown reflects data for the whole market

Asset Class	Dollar Value in Billions	Share of Portfolio
U.S. Treasuries and Strips	53.0	35.3%
Agency debt	7.8	5.3%
Agency MBS and CMO	66.3	44.2%
Corporate bonds	5.1	3.4%
Equities	8.3	5.5%
ABS	2.9	1.9%
All other	6.6	4.4%
Total	150	100%

Volume that can be liquidated without price change

- Reflects input from market participants and staff from NY Fed's Market group staff
- Assumes normal market conditions

Collateral Type	Amount that can be liquidated in one day without an adverse impact on market prices
U.S. Treasuries and Strips	$7.5 billion
Agency debt	$2 billion
Agency MBS and CMO	$4 billion
Corporate bonds	$250 million
Equities	$500 million
ABS	$125 million

Days to liquidate

Long liquidation horizons, especially given conservative assumptions, suggest a high risk of fire sales

Collateral Type	Days needed to liquidate segment of hypothetical portfolio
U.S. Treasuries and Strips	8
Agency debt	3
Agency MBS and CMO	16
Corporate bonds	18
Equities	18
ABS	24

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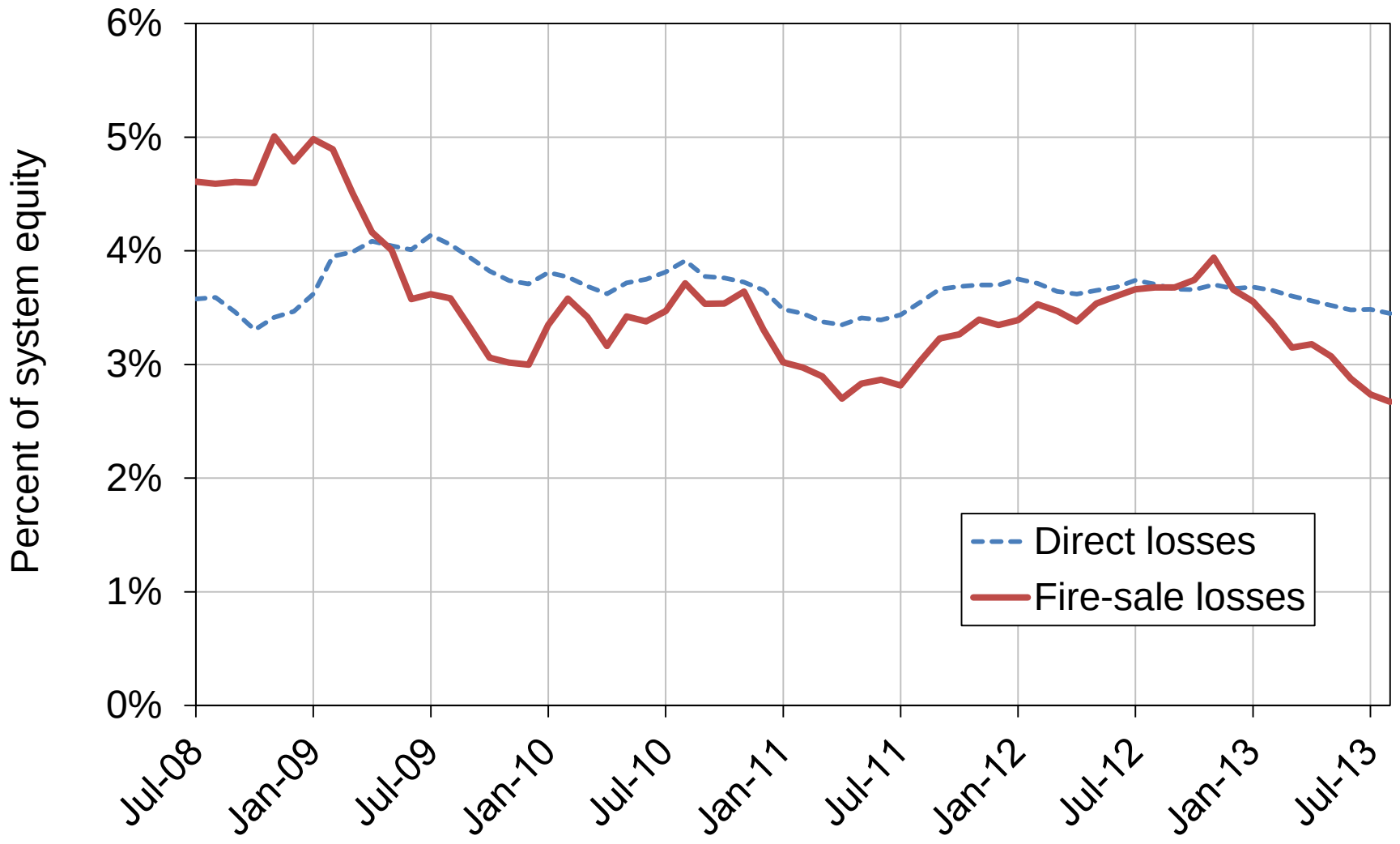
Fire-sale spillovers and systemic risk

- Quantify fire-sale spillovers as measure of systemic risk
  - Based on framework of Greenwood, Landier and Thesmar (2012)
- **Hypothetical scenario:**

1. Shock hits one or more asset classes
2. Dealers suffer losses from the asset shock → **Direct losses** → Like a stress test
3. To delever, dealers sell assets
4. Asset fire sales have price impact
5. Dealers suffer losses from the fire sale → **Fire-sale losses** → Our focus

Potential losses over time (0.1% shock to all assets)

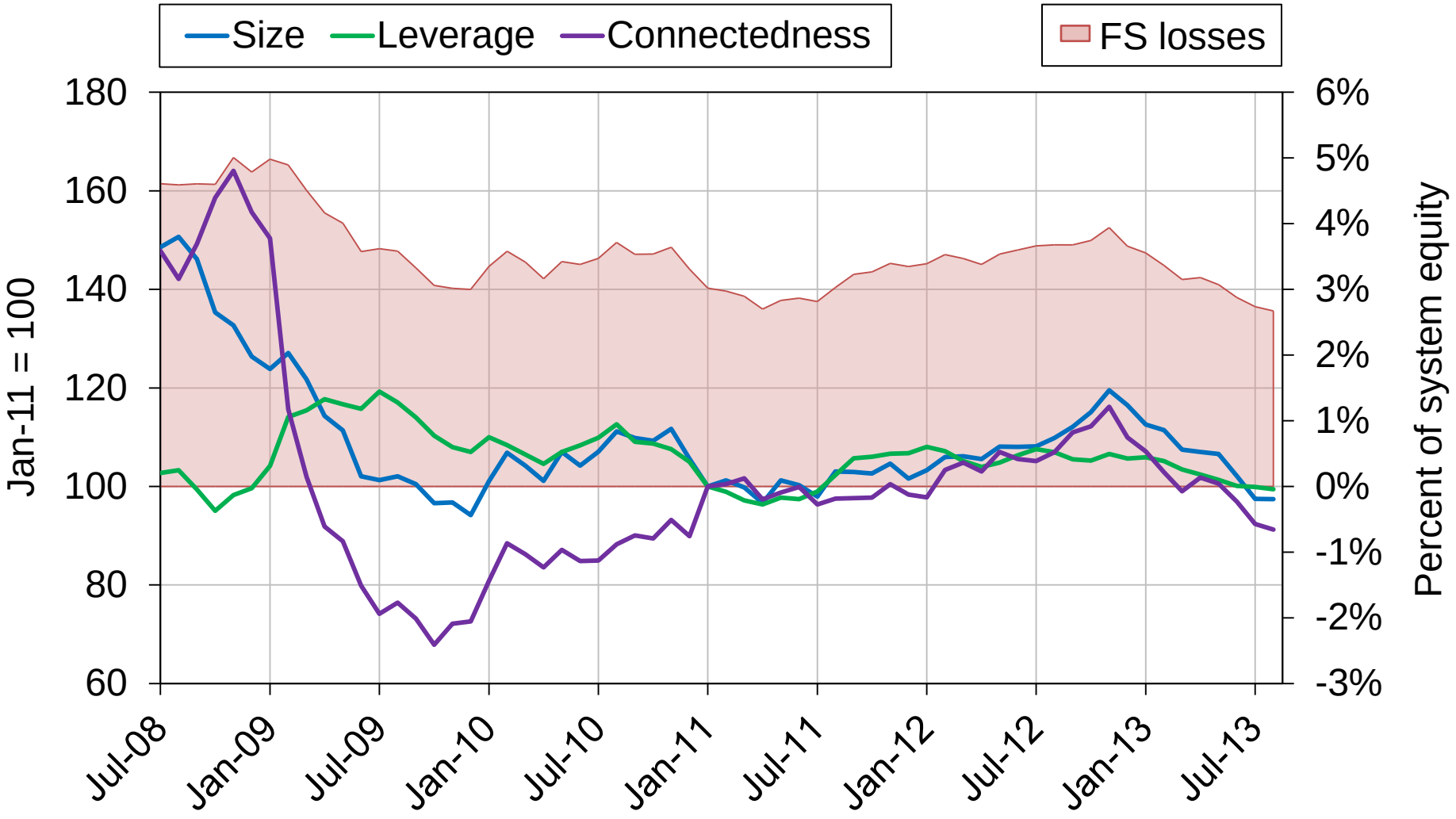


The measure and its components

$$\frac{1}{e}\sum_i \underbrace{\left(a_i \times b_i \times \sum_k \ell_k a_k m_{ik} \times f\right)}_{\text{contribution of dealer i}}$$

- **Size a_i** (total assets)
  - More sales → deeper price impact → larger fire-sale losses
- **Leverage b_i** (ratio debt to equity)
  - More levered → larger initial losses → more sales …
- **Connectedness $\sum_k \ell_k a_k m_{ik}$** (holds illiquid, widely held assets)
  - More illiquid → deeper price impact → larger fire-sale losses
  - Widely held → more fire-sale spillovers to other dealers

Decomposition of fire-sale losses



Conclusion

- The risk of pre- and post-default fire sales is still a major concerns for financial stability, notably in US TPR market

- Regarding pre-default fire sales:
  - The Fed can influence the practices of BHC-affiliated dealers to reduce their vulnerability to runs – but not IBDs
  - Other regulators can influence the behavior of lenders in this market in ways that reduce their propensity to run
- But we can't completely eliminate run risk
  - A post-default solution is needed
- We need the market to come together to fix this problem
  - LTCM